Pre and posttest assessment of ankle mobility and strength for collegiate women soccer players

Danielle Lacasse and W. W. S Njororai

Introduction

In the fall of 2019, data on injury rate, injury type, and injury occurrence, was collected between both men and women's soccer at the University of Texas at Tyler. It was found that women overall had a significantly higher number of injuries compared to men with over 60% of the injuries occurring from an ankle sprain or ankle strain. This data complements research in the fact that women soccer players overall suffer the most from lateral ligament complex tears and medial tibiofibular ligament sprains. Therefore, this study was done to provide a more effective warm up and cool down in order to reduce overall ankle injuries. Due to COVID-19, the original plan was altered and the women did not compete in a full season like 2019, so the results were determined on practices and strictly intrasquad games.

Purpose:

To conduct a 13-week ankle specific warm up and cool down program to increase ankle strength and mobility in women soccer players

Materials and Methodology

28 players were examined on the UT Tyler Women's Soccer team with the help of the Athletic Trainers.

Step 1: Pretest
- Test ankle strength: Test dorsiflexion, plantarflexion, inversion, and eversion using the MMT scale from 1, a flickering contraction, to a 5, full range of motion with maximal resistance of gravity,
- Test ankle stationary range of motion: Test dorsiflexion, plantarflexion, inversion, and eversion using a goniometer.
- Test Functional range of motion: Have the athlete preform a full squat, an inline lunge with both feet, and a hurdle step with both feet. The testing is done with a MMT scale ranging from a 1, full range of motion, to a 3, no range of motion.

Step 2:
- Implement a 13 week warm up and cool down with ankle strengthening and mobility exercises with the help of the strength and conditioning coaches and athletic trainers
- Warm up
  - Add stand and reach, squats, lunges, and ankle zig zags.
- Cool down
  - Add malasada squat, ankle rolls, and ankle full range of motion rolls.

Step 3: Post test
- Retest everything from the pretest after the 13 week program and compare data.
- Step four: Data analysis via dependent t-test

Results

Strength

Table 1: Right Ankle Strength during pretest and posttest

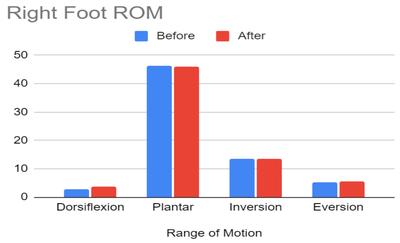
Right Ankle	Before	After	P Value
Dorsiflexion	4.93	4.95	0.587149
Plantar	4.94	4.94	0.8827
Inversion	4.85	4.97	**0.074822**
Eversion	4.76	4.95	0.96524

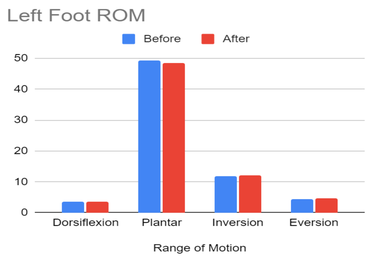
Table 2: Left Ankle Strength during pretest and posttest

Left Ankle	Before	After	P Value
Dorsiflexion	4.94	4.88	0.447343
Plantar	4.83	4.87	0.744044
Inversion	4.68	4.92	0.8076
Eversion	4.68	4.91	**0.019938**

- After the 13 week program, apart from the left ankle dorsiflexion, ankle strength improved for dorsiflexion, plantarflexion, inversion and eversion
- However, the only two that are significant are inversion on right foot and eversion on left foot
- Important findings
- The weakest foot was the non-dominant left foot for the majority of players
- Biggest increase came from ankle inversion and eversion- which is where most injuries occur

Stationary Range of Motion





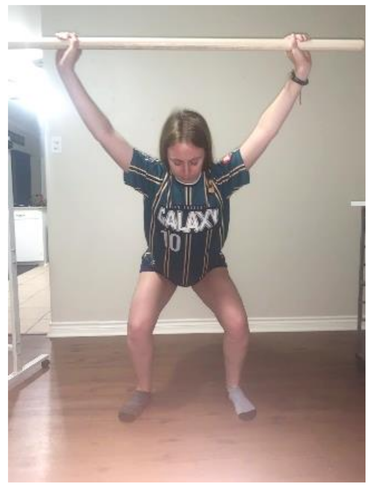
- There was an increase in degree of dorsiflexion, inversion, and eversion for both left and right foot
- There was a decrease in degrees for plantarflexion- this was normal because of hypermobility in ankle joints
- Only dorsiflexion of right leg was statistically significant

Functional Range of Motion

Table 5: Functional Ankle Testing Before and After Season

Functional Test	Before	After	P Value
Squat	1.62	1.4	.0752
In-Line Lunge (Left)	1.53	1.34	.205
In-Line Lunge (Right)	1.42	1.4	.618
Hurdle Step (Right)	1.01	1.00	.327
Hurdle Step (Left)	1.04	1.02	.312

- All functional test improved, however the squat is the only statistically significant functional test



Discussion, Recommendation and Limitation

It is recommended that a study of this nature be replicated with better assessment test instruments as well as in a setting where athletes are fully involved in a competitive schedule. One of the limitations of the current study is that over the 13-week program, athletes were mainly engaged in practice and five scrimmages. Practicing for a long time does not bring the best out of players to fully apply themselves in conditioning programs. Additionally, a record of injuries during a competitive season would reveal any association between the ankle condition and the occurrence of injury. In the current study, it was not possible to collect a record of injuries given the absence of a competitive schedule. At a practical level, the research revealed that there were improvements in strength and mobility at ankle, although not statistically significant. Coaches and trainers need to continue streamlining the conditioning regimen in order to position the girls to play without fear of sustaining injuries. We recommend that the UTTYLER soccer programs continue incorporating strength and range of motion exercises within the conditioning program as well as coordinating with the athletic trainers to minimize the rate of ankle injuries.

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The University of Texas at TYLER